NEWSLETTER NO.2 VOLUME 2 SEPTEMBER 1999

UNIMAS RESEARCH UPDATE

FOCUS ON TECHNOLOGY PAID OFF

Prof. Ghazally Ismail
charlie@adm.unimas.my

"With the use of these modern technologies, we have continued to push the boundaries of knowledge in all directions and extending its applications well beyond our current imagination."

The year 1998 has been a source of satisfaction and pride to observe the rapid growth and remarkable achievements made in the areas of research at UNIMAS. Within a short span of time, the university now has gained recognition in its research competence in a number of areas. From the onset we have focused our effort at exploiting the technological promise of today's rapidly expanding fields including biotechnology, information technology, genomics and bioinformatics and communication systems. The retribution from this focus on modern technologies has been obvious at UNIMAS. These technologies have evolved and matured over the last six years since our university was first established. Today they have spawned new disciplines and have radically changed the way we look at issues and challenges offered in the fields of social sciences, economics, applied and creative arts, languages and human development. All faculties and research institutes at UNIMAS have been reinvigorated and empowered to explore complex fundamental and practical problems in their respective disciplines at a level which is impossible to envisage or attempt to explain without the use of these modern technologies. We have continued to push the boundaries of knowledge in all directions and extending its applications well beyond our current imagination.

This Newsletter is published every three months by the Research & Services Division, UNIMAS

Please address all enquiries to the editor:
Prof Ghazally Ismail
Deputy Vice-Chancellor (Research & Services)
Tel : +6 082 672502
Fax : +6 082 672111
E-Mail : charlie@adm.unimas.my

SAGO STARCH PROPERTIES SCIENTIFICALLY UNRAVELLED

Dr. Fashihuddin Badruddin Ahmad
bfasih@frst.unimas.my

"...the physicochemical properties of sago starch were very similar to potato starch. ...its swelling and solubility increase with temperature at a magnitude similar to potato and tapioca starches but higher compared to maize or pea starches. ...Sago starches generally have better freeze-thaw stability compared to other starch varieties."

Starch is composed of chains of linear molecules called amylose and amylopectin. Although amylose accounts for only 20-32% of the total in the case of many common starches, it makes a major contribution to the overall properties. Starch occurs in the form of granules which are insoluble in cold water and when aqueous suspensions are heated above a certain temperature, swelling and dissolution occurs. This process is called gelatinization. Dr Fashihuddin of Unimas has spent the last four years studying the properties of sago starch isolated from sago palm, *Metroxylon* which is distributed throughout Southeast Asia. About 3 x 10 tonnes of sago starch are produced annually in Malaysia. Using sago starch obtained from Malaysia, Thailand and Indonesia, he reported that amylose contents were about 27% and the average particle size was around 30 mm. Based on the physicochemical measurement, the properties of sago starch were very similar to potato starch.

The swelling characteristics and rheological properties of a range of sago starches obtained from different sources were also studied. The swelling power of the sago starches were all very similar to that of potato and tapioca starches, but higher that maize and pea starch. The sago starches show a two-stage swelling, similar to cereal starches, in contrast to potato and tapioca starches that show a one-step swelling. For sago starches, the first stage of swelling and solubility occurs at the gelatinization temperature, about 70C while the second stage of swelling occurs at about 80C. The swelling and solubility increase with temperature, and the magnitude is quite similar to potato and tapioca starches but higher compared to maize or pea starches.

Starch gels undergo further crystallization during storage resulting in an increase in the rigidity and syneresis usually occurs; where the liquid separates from the gel due to contraction. This process which is commonly known as retrogradation depends on various factors such as the botanical origin of the starch, the concentration of the starch paste, the heating and cooling conditions, pH, and the presence of solutes such as lipids, salts and sugars. The freeze-thaw stability of the sago starch was also investigated. The results show that sago starches generally have better freeze-thaw stability compared to other starch varieties. Interestingly, one of the eleven sago starches studied by Dr Fasihuddin showed resistance to undergo syneresis. The reason for this discrepancy is not immediately clear and needs further elucidation.

Reference:

Fashihuddin Ahmad and P.A. Williams (1998) Rheological Properties of Sago Starch. *Journal of Agricultural Food Chemistry* 46 No 10 4060-4065

Fashihuddin Ahmad and P.A. Williams (1998) Rheological Properties of Starch from Sago Palm. *Sago : The Future Source of Food and Feed The 6th International Sago Symposium.* Pekanbaru, Indonesia.

NEW INSIGHTS INTO MOSQUITO LARVAL PHYSIOLOGY

Nor Aliza Abdul Rahim

"That mosquitoes are unable to biosynthesize C20 phospholipids from C18 has intrigued many insect physiologists... an enzyme phospholipase A2 was discovered"

It has been suggested that all insects require polyunsaturated acids in their diet for a variety of developmental and physiological processes. Like mammals, most insects satisfy this requirement by obtaining C18 polyunsaturated fatty acids from the ubiquitous components of plant and animal lipids. Mosquitoes however is known to differ from other insects in that their dietary fatty acid requirements cannot be met by the usual C18 polyunsaturated fatty acids. They require C20 arachidonic acid or other C20 polyunsaturated fatty acids during their larval stages to complete the developmental excursion through to normal adulthood. This is a peculiar dietary requirement, not known in other insect groups. In the absence of dietary C20 polyunsaturated fatty acids, some mosquito species die in larval stages. Others may complete development through the pupal stage, but the adults either fail to merge, or are not capable of flight activity.

The fact that mosquitoes are set apart from other insects in their inability to biosynthesize C20 phospholipids by elongation or saturation of C18 has intrigued many insect physiologists. Research carried out by Nor Aliza of Unimas and Professor Stanley of University of Nebraska resulted in an enlightening insight into how mosquitoes acquire C20 phospholipids needed for their structural and metabolic functions. They discovered an enzyme phospholipase A2 in whole larva and midguts of the yellow fever mosquito *Aedes aegyti* that is responsible for hydrolyzing fatty acids from dietary phospholipids to release essential fatty acids for normal larval and adult growth.

Reference:

Nor Aliza A.R. and D.W. Stanley (1998) A Digestive Phospholipase A2 in Larval Mosquitoes, *Aedes aegyti*. *Insect Biochemistry and Molecular Biology* 28:561-569

RESEARCH UPDATE

"EXTINCT SPECIES" REDISCOVERED BY UNIMAS SCIENTIST

Dr. Indraneil Das
idas@ibec.unimas.my

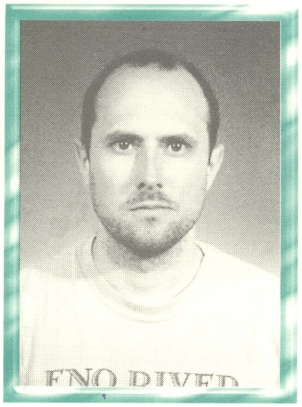
"A criterion for defining extinction is the absence of a species from the wild for 50 years. Though this is not a perfect criterion, it is the only one that is universally accepted presently".

In trying to understand why species of plants and animals became extinct locally, regionally and globally, the Committee on Recently Extinct Organisms was set up, to list all species that have become extinct since AD 1500. A criterion for defining extinction is the absence of a species from the wild for 50 years. Though this is not a perfect criterion, it is the only one that is universally accepted presently. The nagging questions that often clouded such issue include whether all appropriate habitats were surveyed, and whether enough time was spent before such a conclusion was made. A Unimas scientist Dr Indraneil Das of the Institute of Biodiversity and Environmental Conservation (IBEC) questioned the case of recently "extinct species" of a lizard that has been considered extinct based on the above criterion. In 1891, the British Museum zoologist, George Boulenger, described a lizard, *Calotes andamanensis,* which he presumed was from the Andaman Islands. No further examples of this distinctive species were to be collected for the next 100 years, despite intensive faunal inventories from these islands. But in 1997, two nesting females of the species were collected from the southern tip of the Western Ghats, hill ranges on the south-western coast of India. It now appears that the species has not been collected for over a century because it is highly arboreal, ascending to the ground only for nesting. For scientists who are currently engaged in inventorying biodiversity of our tropical forests, there are important lessons to be learnt from this rediscovery of "extinct species". Most species live in the canopy and thus away from the reach of most researchers. They are typically cryptic in being adept at hiding in the leaf litter, in dense vegetation, under fallen tree trunks or under the soil. Many are rare and some are active only seasonally or at specific times of the day; mostly at night. To obtain listings of species in the tropics thus is but the first step in gaining important insights on its conservation requirements. Too many species have not been seen for 50 years - are they really extinct, or have we merely not searched for them?

Reference:

Ishwar, N.M. & I. Das. 1998. Rediscovery of *Colotes andamanensis* Boulenger 1891 and a reassesment of the type locality. *J. Bombay Natural History Society. 95/(3): 513-514*

CONSERVATION OF COMMERCIALLY LOGGED RAINFOREST MERITORIOUS?



Charles Cannon
chc2@ocpub.duke.edu

In recent decades, conservationist have despaired over the unprecedented rate of rainforest destruction through logging, clearing and burning. Their concern has anchored on the question of tree diversity which is fundamental in maintaining the overall rainforest biodiversity. Because trees provide resources and habitat structure for almost all other rainforest species, a forest area low in tree diversity is expected to also yield low total species biodiversity. This assumption brings into question whether it is worthwhile to conserve large tracts of commercially logged tropical rainforest from which many marketable tree species have been removed. Further such logged-over forests also suffer from other side-effects of logging activities such as loss of non-timber forest species during road construction, damages to soils and habitats, and reduces timber growth potential.

Although tree diversity was maintained in specially controlled, low impact logging trials in Queensland, Australia, the effects of commercial logging on tree diversity in tropical rainforest are largely unknown. A study conducted by Charles Cannon, a research fellow at the Institute of Biodiversity and Environmental Conservation(IBEC) UNIMAS revealed that selectively logged tropical rainforest in Indonesia contain high tree species richness, despite severe structural damage. He reported that logging reduced both tree density and the number of tree species per 0.1-ha plot. For all trees >20 cm in diameter, density fell by 41% and the number of species per plot by 31%. However he reasoned that per plot richness alone is inadequate for assessing logging effects on tree diversity. It would be necessary to sample proportionately larger areas in logged forest to obtain similar number of individuals, and thus similar species richness, to unlogged forest. When the study was carried out in samples of the same numbers of trees, logged forest was shown to contain as many tree species as unlogged forest. Unlogged forest yielded 329 tree species while 8-year logged forest gave 340. Nor did logging causes major changes in family-level taxonomic composition of trees >20 cm in diameter. Dipterocarpaceae dominated not only unlogged forest (15 species and 31% of trees) but also 8-year logged forest (16 species and 35% of trees). Although logging removed many large dipterocarps, logged species were well represented in the smaller trees. This persistent diversity of trees >20cm in diameter will be able to provide most of the reproductive imputs to other species of the forest community in the near future. These findings point to the conservation value and potential of large tracts of commercially logged tropical rainforest.

"Logged forest was shown to contain as many tree species as unlogged forest.... Nor did logging causes major changes in family-level taxonomic composition of trees >20 cm in diameter.... These findings point to the conservation value and potential of large tracts of commercially logged tropical rainforest"

Reference:

Cannon, C.H., D.R. Peart and M. Leighton (1998) Tree Species Diversity in Commercially Logged Borean Rainforest *Science* Vol 281 1366-1368

SUNGAI BAKONG STUDY REVEALS POTENTIAL LAND AND WATER USE CONFLICT

Prof. Murtedza Mohamed
ted@cttc.unimas.my

"The water quality indices for all the locations in middle and lower stretches of Sg. Bakong fall within the 'very polluted' category, primarily due to the natural abundance of peat leachates and poor aeration of water due to the sluggish flow in this tidal zone."

Failure to correlate and integrate land use and water use elements in a watershed development planning may result in a conflict detrimental to the environment therein. The proposed large scale agricultural development and establishment of a major water intake system in the Bakong watershed in Miri District, may illustrate the eminence of such conflict. Sg. Bakong has been identified as the future source of additional water supply for the rapidly growing Miri township. A study by UNIMAS has established the baseline database for Sg. Bakong, particularly the information pertaining to water quality, hydrology and the present and future land use trends in the catchment. In terms of aquatic resources, a total of 10 families of fish represented by 15 genera and 22 species are found in the main Sg. Bakong and its tributaries. The fish population in the Sg. Bakong system are mainly dominated by species that are relatively tolerant to low oxygen condition, highly acidic water and rich in decaying organic matter. Its water quality is generally affected by high level of suspended colloids and peat material. This condition is the result of combined input of runoffs from the predominantly swamp forest area and erosion from the disturbed headwater areas.

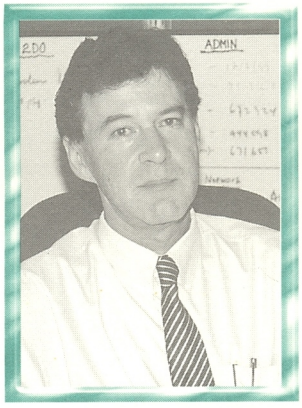
The water quality indices for all the locations in middle and lower stretches of Sg. Bakong fall within the 'very polluted' category, primarily due to the natural abundance of peat leachates and poor aeration of water due to the sluggish flow in this tidal zone. There are four primary sources of pollutants presently affecting and potentially capable of further deteriorating the aquatic environment of the Bakong River: (1) the land conversion activities that currently discharge sediments at a rate in excess of 1000 t km-2 y-1 from plantation areas within the catchment, (2) the use of agrochemicals in the surrounding plantations, (3) the peat swamp leachate possessing high levels of humic contents, and (4) the discharge of raw sewage direct into the river by human settlers along its banks. The study recommended several key mitigation measures which include the employment of least impact land conversion practices, establishment of a Catchment Management Committee for effective monitoring of land and water use, and incorporation of certain modifications to the raw water treatment process.

Reference:

Murtedza Mohamed, Lau Seng, Lim Yeo Howe, Nabil Bessaih and Khairul Adha, A. Rahim (1998) Baseline Water Quality Study of Sungai Bakong, Miri Sarawak. *A Report of CTTC UNIMAS Submitted to The Department of Environment Malaysia*

Murtedza Mohamed and Aziz A Rasol Proc. Baseline Water Quality Study of Sungai Bakong, Miri, Sarawak. *Proceedings of Seminar on Land Use & Coastal Zone Management,* 11-12 Aug 1998. Miri, Sarawak.

MORE EFFECTIVE CURRICULUM MODELS FOR LITERACY LEARNING TESTED



Peter F. Culip
pculip@clcs.unimas.my

Vygotsky's (1962) notion of the zone of proximal development (zoped), together with a number of the socio-cognitive concepts with which it interfaces, has had a significant and widespread impact on the way we view language, literacy (reading and writing) and learning. These ideas have yet to make any general impact in Malaysian classrooms however. Briefly, the zoped refers to the distance between the actual cognitive development level as evidenced by independent problem-solving, and the potential development level as evidenced by collaborative problem-solving with more capable others.

Taken up by Bruner (1986), the idea of the zoped was developed into the associated concept of scaffolding. Scaffolding involves the erection, and subsequent dismantling, of an instructional support system by the 'expert' (e.g. modeling and guidance) in order to enable the apprentice to successfully enter and cross the zoped. This project involved adapting and refining two curriculum models in which scaffolding plays a central role. Unimas researchers have applied these two models in literacy classrooms in Malaysia. In both cases, the original models were fortified by foregrounding scaffolding on multiple levels. The first describes the practice of 'shared reading' in pre-school and primary English classes and the second outlines a genre-based teaching model applied in primary, secondary and tertiary contexts. Both models have the notions of the zone of proximal development and scaffolding at their socio-cognitive cores and a systemic-functional model of language and language learning as their linguistic foundations.

In the first, responsibility for reading is gradually passed from teacher to learner through the use of jointly negotiated 'Big Books' which can be read to/by children as a class or in groups. The model emphasises a wide variety of genres and their characteristic generic structures, and the lexicogrammatical differences between familiar 'speech' and relatively unfamiliar 'writing'. In the second model, these emphases are maintained. This model is comprehensive, in that it attends to the four main language areas of speaking, listening, reading and writing. Again, responsibility (this time for text production) is passed judiciously from teacher to learner through a series of curriculum stages which move from teacher-centred modeling to learner-centred control. In both cases, a deliberate effort has been made not to keep secrets from students; that is, both the nature of the models and the way in which language works to make meaning (a functional grammar), are made explicit to learners. Such curriculum genres hold the potential for more effective teaching and learning, and for the inclusion of non-mainstream learners in the mainstream literacy and learning practices of our schools.

"The notion of zone of proximal development together with a number of socio-cognitive concepts was developed into the associated concept of scaffolding. ...Such curriculum genres hold the potential for more effective teaching and learning, and for the inclusion of non-mainstream learners in the mainstream literacy and learning practices of our schools."

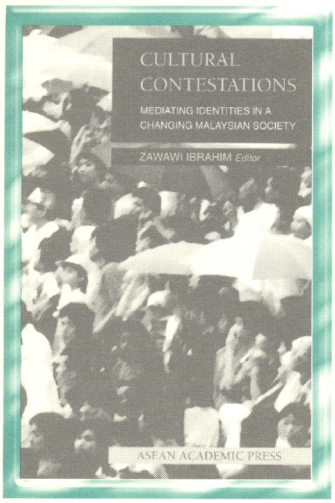
Reference:

Cullip, P.(1998) Scaffolding Literacy Learning: Vygotsky in the classroom.
Cognitive Science into the 21st Century : Overview and Implications
Proceedings of the National Conference of Cognitive Science:, Kuala Lumpur

NEW BOOKS BY UNIMAS STAFF

CULTURAL CONTESTATIONS : MEDIATING IDENTITIES IN A CHALLENGING MALAYSIAN SOCIETY

ASEAN Academic Press (ISBN 1-901919-04-8)



EDITOR: Zawawi Ibrahim
Professor of Sociology UNIMAS

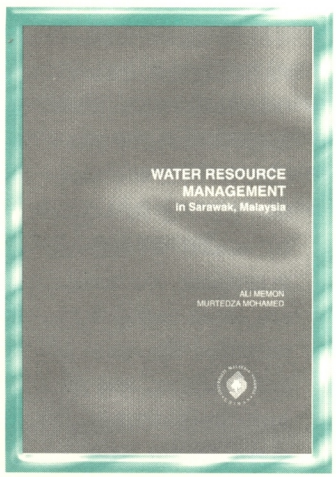
This book combines fresh and critical perspectives into the analysis of the Malaysian nation-state and its post- colonial social transformation. In contrast to the conventional approach, it investigates development as a process of cultural contestation in which new social meanings or identities are continuously being constituted, renegotiated and reconstructed, involving the state institutions, classes and other groups of social actors. It therefore recognizes mediating identities as a crucial process in the whole phenomenon of the emergence, consolidation and sustainability of the modern nation-state.

This collection, written by leading Malaysianists and Malaysian scholars from the disciplines of social anthropology, sociology, political science and literature, for the first time, brings together both theoretical and empirical focus of the above discourse.

Contributors:
Shamsul A.B., Heng Pek Koon, Abdul Rahman Embong, Hendrik M.J. Maier and Zawawi Ibrahim

SARAWAK WATER RESOURCE MANAGEMENT

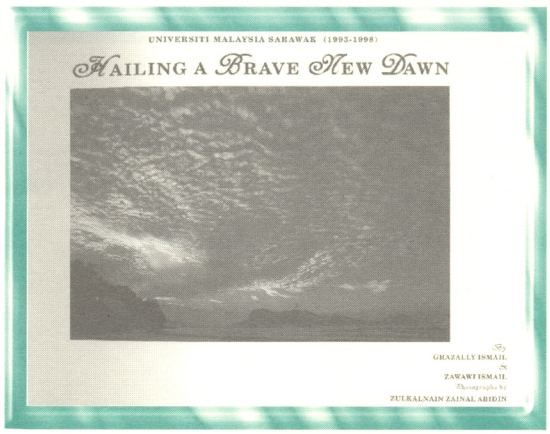
CTTC UNIMAS Publication (ISBN 938-9151-04-5)



AUTHORS :
Ali Memon, Lincoln University, New Zealand
Murtedza Mohamed, Universiti Malaysia Sarawak

This monograph on water resource management in Sarawak begins with an introduction (Chapter 1) and an overview of the concepts and approaches in the field of sustainable water resource management (Chapter 2). This is followed by specific descriptions of the policy context for water resource management in Sarawak (Chapter 3). It traces the inter-related strands that make up the contextual framework for making decisions about water management. Chapter 4 analyses how different uses of surface and ground water are managed in Sarawak. These include abstractive uses (domestic and industrial water supply; irrigation), in-stream uses (liquid and solid waste disposal; river transport; water-based recreation; fisheries and aquaculture; hydropower; and aquatic biodiversity conservation) and flood hazard mitigation. Chapter 5 provides an overview of water resource availability and quality and data collection relating to these aspects. Finally, Chapter 6 summarises the major findings and concludes the discussion by presenting a number of management options available to the Sarawak State government.

UNIVERSITI MALAYSIA SARAWAK (1993 - 1998) HAILING A BRAVE NEW DAWN



AUTHORS:
Ghazally Ismail, Universiti Malaysia Sarawak
Zawawi Ismail, Universiti Malaysia Sarawak

PHOTOGRAPHS BY:
Zulkalnain Zainal Abidin,
Universiti Malaysia Sarawak

UNIMAS Publication

This coffee-table book is a compilation of photographic images tracing the growth of Universiti Malaysia Sarawak since its establishment in 1993 to 1998. The accompanying text was effectively articulated by the Vice-Chancellor and the Deputy Vice-Chancellor of UNIMAS to expound their university's mission and vision in facing the challenges of the next millennium. The authors came forth to share with their readers valuable learning experience in positioning the university to serve its core business in the generation, dissemination and application of knowledge. The text precisely describes their strategies in the implementation of study programmes for effective teaching and learning; building features of excellence through advocacy of quality in teaching, research and services; optimizing the use of information technology in faculty communication; teaching and learning; research and services; administration and governance of the university; achieving a global graduate profile through innovative curricular development and maintaining an upbeat image of a credible and reputable institute of higher learning at both regional and international levels. The text reveals how these two academic leaders have authoritatively charted the direction and growth of their university to greater heights within a short period of five years.

NEW RESEARCH GRANTS FROM UNIMAS SEED MONEY

PROJECT LEADER		RESEARCH TOPIC	AMOUNT (RM)
Prof Murtedza Mohamed	CTTC	Sarawak intergrated environment management study	34,600.00
Prof Murtedza Mohamed	CTTC	Fish species diversity in relation to aquatic environment in estuaries and coastal zones of Kuching Bay, Sarawak	13,000.00
Prof Murtedza Mohamed	CTTC	Catchment Management Plan: Issues and Strategies	22,817.00
Dr M.Z. Abedin	FENG	Strength and deformation characteristics of peat soil	20,000.00
Dr Ha How Ung	FENG	Effects of damages on the vibration characteristics of composite structure	18,800.00
Dr Ha How Ung	FENG	The effect of damage on the mechanical properties of carbon fibre reinforced plastics	42,000.00
Mohammad Omar Abdullah	FENG	The use of chemical-computational fluid dynamic codes in visualizing flow behavior of filtrate and chemical fluids	20,000.00
Dr Nabil Bessaih	FENG	Study of the evapotranspiration at regional scale using satellite observations	19,800.00
Dr Nabil Bessaih	FENG	Dissipation of hydraulic energy by baffle blocks with an upstream face sliding vertically	20,000.00
Dr Law Puong Ling	FENG	Assessment of human exposure to air pollutants from wood processing facilities	48,890.00
Ahmad Kamal Abdul Aziz	FENG	Constitutive modeling of peat soil	16,200.00
Lim Yeo Howe	FENG	Regional flood frequency analysis for Sarawak	20,000.00
Dr Law Puong Ling	FENG	Evaluation of nearby population and in-plant worker exposures to toxic chemicals released from manufacturing facilities Industrial Zone (Sjfiz)	20,000.00
Andrew Ragai Henry Rigit	FENG	Biomedical engineering project Proposal - CAD & performance prediction of centrifugal cardiac pump	46,800.00
Park Young Soon	FENG	A computer method for partial differential equations with variable coefficients in engineering	12,000.00
Andrew Ragai Henry Rigit	FENG	OptimiZing the efficiency of electrical power generation by using the CPP cogeneration cycle	49,700.00
Andrew Ragai Henry Rigit	FENG	Computer-aided design and testing of turbocharges	31,200.00
Zunika Amit	FMHS	The occurrence of Pneumocystis in Malaysian mammals	19,750.00
Dr Tan Poh Tin	FMHS	Viruses causing central nervous system infections in children admitted to the hospitals in Kuching & Serian	10,100.00
Muna Sabri	FMHS	Study of human T-cells lymphotropic virus types I and II (HTLV-1 and 2) infection among blood donors in Sarawak	19,900.00
Jenny Maria Paul Subeh	FMHS	A focused ethnographic study of mothers' knowledge, attitudes and practices of child feeding in the state of Sarawak	10,130.00
Jenny Maria Paul Subeh	FMHS	An evaluation of the registered nurses' competence following the implementation of a foot care program conducted in Sarawak	2,982.50
Chang Ching Thon	FMHS	The relationship between hostility and coronary heart disease in Sarawak	10,505.20

RESEARCH UPDATE

PROJECT LEADER		RESEARCH TOPIC	AMOUNT (RM)
Dr Henry Rantai Gudum	FMHS	Immunohistochemical expression of p53, bcl-2 oncoprotein and ki67 and analysis of p53 mutation by PCR in non-Hodgkin's lymphoma	19,630.00
Jane Buncuan	FMHS	The prevalence of malnutrition among Bisaya children aged below seven years in three selected areas in the Limbang District	20,864.00
Bruce Dehnert	FACA	Traces: A study of the individual prerogative, spiritualism and cultural motive within Sarawakian Iban and immigrant Chinese pottery	19,950.00
Hong Kian Sam	FCSHD	Cognitive and problem-solving styles and information-seeking behaviour in the www	10,220.00
Mohd Razali Othman	FCSHD	A web-based database system : An implementation for the Unimas assertive behaviour inventory (U-ABI) phsychologicatest test	10,018.00
Sabasiah Husin	FCSHD	Applying constructivism in primary school education : a cognitive approach to enhance learning of mathematics	2,170.00
Angela Anthonysamy	FCSHD	The nature of mathematical thinking in children attending kindergarten programs	7,880.00
Mohd Razali Othman	FCSHD	An information processing analysis of experts problem solving in engineering and computing	19,785.00
Philip Nuli Anding	FCSHD	Cognitive modeling as an approach to a systematic training need analysis for air traffic controllers	2,045.00
Leniiw Roman	FCSHD	The efficacy of the transfer of learning provided in a training organization	9,982.00
Mai Sumiyati Ishak	FCSHD	Design specification for the stimulation of the highly automated ship's bridge systems	17,651.00
Christina Misa Wong	FSS	Identifying effective strategies in health development among women through the community participatory approach	14,148.00
Sara Ashencaen Crabtree	FSS	Medical anthropological perspectives on mental distress in Kuching	5,000.00
Dr Abdul Rashid Abdullah	FSS	The Kajang of Belaga District: A study of resource use and management among marginal communities	20,000.00
Dr Kasing Apun	FRST	Genome fingerprinting by pulsed-field gel electrophoresis to differentiate Burkholderia pseudomallei strains	11,912.00
Dr Mohd Azib Salleh	FRST	Identification and analysis of genes controlling the flowering process in sago	20,000.00
Shabdin Mohd Long	FRST	Biomonitoring of heavy metals	3,930.00
Dr Hamsawi Sani	FRST	Peat humates and their potential as soil conditioner	20,000.00
Dr Kopli Bujang	FRST	Lactate fermentation of sago starch	20,000.00
Shabdin Mohd Long	FRST	Community dynamics and toxin concentrations of free-living nematodes in Kuching Bay, Sarawak	20,000.00
Dr Fatimah Abang	FRST	Moth diversity and vertical distribution in a lowland mixed dipterocarp forest canopy of Poring hotsprings, Sabah	20,000.00
Ramlah Zainudin	FRST	Phylogenetic analyses of mtDNA of the Bornean voiceless frogs from the genus Rana	20,000.00

PROJECT LEADER		RESEARCH TOPIC	AMOUNT (RM)
Prof Murtedza Mohamed	FRST	Charaterization and removal of humic substances and treatment byproducts from water tainted by peat swamp leachate	20,000.00
Dr Sepiah Muid	FRST	Biodiversity of soil microorganisms in diverse natural habitats of Samunsam wildlife sanctuary area	19,950.00
Dr Eswaran Padmanabhan	FRST	Characterization and allocation of some lowland soft soil resources in the Kota Samarahan and Samunsam areas	20,000.00
Prof Murtedza Mohamed	FRST	Chlorinated organics in drinking water	10,000.00
Faaizah Shahbodin	FIT	Critical issues for the management of information technology in Malaysia : A survey	7,681.00
Dr Abdelhamid Abdesselam	FIT	New knowledge-based image processing tools to interprete satellite images	17,300.00
Nicolas Pilcher	IBEC	Biotopes of Sabah and Sarawak coastline,Part1: Corals and other reef invertebrates	25,602.00
Nicolas Pilcher	IBEC	Evaluation of current hatchery and monitoring activities for marine turtles at the turtle islands of Sabah	8,378.00
Anthony Kong	IBEC	Population dynamics of mud crab, genus Scylla, in the Sematan mangrove ecosystem, Sarawak	20,070.00
Anthony Kong	IBEC	The value of Sarawak's mangrove forest	5,080.00
Dr Indraneil Das	IBEC	Biodiversity of the herpetofauna of Sarawak and adjacent areas: Spatial patterns, historical biogeography and systematics	19,901.90
Dr Stuart J. Davies	IBEC	The technology, biodiversity and conservation status of plant regeneration and succession in rain forests of Sarawak	20,012.00
Prof Michael B Leigh	IEAS	The development of Sarawak, 1972-1997	20,000.00
Dr Donald T.T Yapp	IHCM	The role of glycoconjugates in the membrane fusion process of the dengue virus envelop protein	20,000.00
Tio Phaik Hooi	IHCM	Real-time biomolecular interaction analysis of dengue2 non-structural protein 1 with specific monoclonal antibodies	19,000.00
Norazila Abdul Aziz	CLCS	Changing the facet of English language learning for smart school success	17,437.20
Peter F Cullip	CLCS	Language use, attitudes and shift among the Remun of Sarawak	7,782.90

CTTC	-	Centre for Technology Transfer and Consultancy
FENG	-	Faculty of Engineering
FMHS		aculty of Medicine and Health Sciences
FACA		aculty of Applied and Creative Arts
FCSHD		aculty of Cognitive Science and Human Development
FSS		aculty of Social Sciences
FRST		aculty of Resource Science and Technology
FIT		aculty of Information Technology
IBEC		stitute of Biodiversity and Environmental Conservation
IHCM		stitute of Health and Community Medicine
CLCS		entre for Language and Communication Studies